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Higher rank chiral polytopes with toroidal facets

Chiral abstract polytopes are combinatorial structures with maximal symmetry by combinatorial rotations, but none by reflections. Many such objects in ranks 3, 4 and 5 are known, but up to date there are very few constructions of chiral polytopes of ranks 6 and higher. In particular, it is still not known whether a given regular polytope of rank n is the facet of a chiral polytope of rank $n+1$. In this talk I will present a construction that shows that all but finitely many regular toroidal polytopes of rank n and type $\{4, 3^{n-3}, 4\}$ are facets of chiral polytopes of rank $n+1$.